

CLAIMS

What is claimed is:

1. A recovery plant that recovers a gaseous component from a process gas, comprising:

an absorber employing a lean solvent and a semi-lean solvent that absorb the gaseous
5 component from the process gas, thereby producing a rich solvent, a semi-rich solvent,
and a lean process gas;

a regenerator fluidly coupled to the absorber, wherein the regenerator extracts the gaseous
component from the rich solvent, thereby regenerating the lean solvent and the semi-lean
solvent;

10 a solvent flow control element, fluidly coupled to the absorber, that combines at least part of
the semi-rich solvent with at least part of the semi-lean solvent to form a mixed solvent;

a cooler fluidly coupled to the absorber, the cooler cooling the mixed solvent; and

a connecting element that feeds the cooled mixed solvent into the absorber.
2. The recovery plant of claim 1 wherein the process gas comprises a flue gas from a
15 combustion turbine.
3. The recovery plant of claim 1 wherein the process gas has a pressure of less than 20 psia
when fed into the absorber.
4. The recovery plant of claim 1 wherein the process gas has a pressure of less than 300 psia
when fed into the absorber.
- 20 5. The recovery plant of claim 1 wherein the gaseous component is carbon dioxide.
6. The recovery plant of claim 5 wherein the carbon dioxide in the process gas has a
concentration of greater than 10 mole %.

7. The recovery plant of claim 5 wherein the carbon dioxide in the process gas has a concentration of greater than 5 mole %.
8. The recovery plant of claim 5 wherein the carbon dioxide in the process gas has a concentration of greater than 2 mole %.
- 5 9. The recovery plant of claim 1 wherein the solvent comprises a chemical solvent.
10. The recovery plant of claim 9 wherein the chemical solvent comprises at least one of an organic amine and a mixed amine.
11. The recovery plant of claim 9 wherein the chemical solvent is selected from the group consisting of monoethanolamine, diethanolamine, diglycolamine, and methyldiethanolamine.
- 10 12. The recovery plant of claim 9 wherein the chemical solvent is monoethanolamine.
13. The recovery plant of claim 1 wherein the rich solvent is fed to the top of the regenerator in a single rich solvent stream.
14. The recovery plant of claim 1 wherein the cooler reduces the temperature of the mixed solvent more than 50 °C.
- 15 15. The recovery plant of claim 1 wherein the cooler reduces the temperature of the mixed solvent more than 10°C.
16. A method of removing a gaseous component from a process gas, comprising:

providing a lean solvent stream and a semi-lean solvent stream;

contacting the process gas in an absorber with the lean solvent stream and the semi-lean
20 solvent stream to produce a semi-rich solvent stream and a rich solvent stream;

combining at least part of the semi-rich solvent stream and at least part of the semi-lean
solvent stream to form a mixed solvent stream; and

cooling the mixed solvent stream, and introducing the cooled mixed solvent stream into the absorber to absorb the gaseous component.

17. The method of claim 16 wherein the process gas comprises a flue gas.
18. The method of claim 16 wherein the process gas comprises a low pressure gas when fed into
5 the absorber.
19. The method of claim 18 wherein the low-pressure gas has a pressure of less than 20 psia when fed into the absorber.
20. The method of claim 16 wherein the gaseous component is carbon dioxide.
21. The method of claim 20 wherein the carbon dioxide is present in the process gas at a
10 concentration of less than 10 mole%.
22. The method of claim 20 wherein the carbon dioxide is present in the process gas at a concentration of less than 20 mole%.
23. The method of claim 16 wherein the lean solvent comprises monoethanolamine.